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SEQUENCE LISTING

<110> TAKASHITA, Ryo  
YASUEDA, Hisashi  
GUNJI, Yoshiya

<120> METHOD FOR PRODUCING ALCOHOL BY USING MICROORGANISM

<130>

<150> JP 2001-270903

<151> 2001-09-06

<160> 5

<170> PatentIn Ver. 2.0

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<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence:primer

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<223> Description of Artificial Sequence:primer

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<213> Artificial Sequence

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39

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Met

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Val Asn Ala Gln Glu Val His Arg Trp Leu Gln Ser Phe Asn Trp Asp

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 Phe Lys Asn Asn Arg Thr Lys Tyr Ala Thr Lys Tyr Lys Met Ala Asn

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Glu Thr Lys Glu Gln Phe Lys Leu Ile Ala Lys Glu Tyr Ala Arg Met

gag gca gtc aag gac gaa agg cag ttc ggt agc ctg cag gat gcg ctg 1735  
Glu Ala Val Lys Asp Glu Arg Gln Phe Gly Ser Leu Gln Asp Ala Leu

acc cgc ctc aac gcc ggt gtt cgc gtt cat ccg aag tgg aac gag acc 1783  
Thr Arg Leu Asn Ala Gly Val Arg Val His Pro Lys Trp Asn Glu Thr

atg aaa gtg gtt tcg aac ttc ctg gaa gtg ggc gaa tac aac gcc atc 1831  
Met Lys Val Val Ser Asn Phe Leu Glu Val Gly Glu Tyr Asn Ala Ile

gcc gct acc ggg atg ctg tgg gat tcc gcc cag gcg gcg gaa cag aag 1879  
Ala Ala Thr Gly Met Leu Trp Asp Ser Ala Gln Ala Ala Glu Gln Lys

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 Asn Gly Tyr Leu Ala Gln Val Leu Asp Glu Ile Arg His Thr His Gln  
 135                      140                      145                      150

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Cys Ala Tyr Val Asn Tyr Phe Ala Lys Asn Gly Gln Asp Pro Ala

155 160 165

ggt cac aac gat gct cgc cgc acc cgt acc atc ggt ccg ctg tgg aag 2023  
Gly His Asn Asp Ala Arg Arg Thr Arg Thr Ile Gly Pro Leu Trp Lys  
170 175 180

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Ile Thr Pro Thr Val Phe Leu Ser Ile Glu Thr Asp Glu Leu Arg His  
235 240 245  
ata aga aaa att ttg ggg ata gta gga ggt gtt ggt 2260

atg gcc aac ggt tac cag acc gtc gtt tcc atc gcc aac gat ccg gct 2263  
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Gln	Lys	Tyr	Phe	Thr	Pro	Val	Leu	Gly	Met	Leu	Phe	Glu	Tyr	Gly	Ser			
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Lys	Phe	Lys	Val	Glu	Pro	Trp	Val	Lys	Thr	Trp	Asp	Arg	Trp	Val	Tyr	310		
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cac	cac	gac	ctg	tat	ctg	ctg	gct	tat	gcg	ctg	tgg	ccg	acc	ggc	ttc	2551		
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Arg	Ala	Arg	Gly	Cys	Glu	Asp	Pro	Ser	Gly	Phe	Ile	Pro	Leu	Met				
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Glu	Gln	Tyr	Glu	Gly	Arg	Glu	Leu	Ser	Glu	Val	Ile	Ala	Glu	Leu	His			
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Gly	Asp	Lys	Leu	Trp	Thr	Leu	Asp	Asp	Ile	Lys	Arg	Leu	Asn	Cys	Val			
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Phe	Lys	Asn	Pro	Val	Lys	Ala	Phe	Asn										
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atg	agc	atg	tta	gga	gaa	aga	cgc	cgc	ggg	ctg	acc	gat	ccg	gaa	atg	3141		
Met	Ser	Met	Leu	Gly	Glu	Arg	Arg	Arg	Gly	Leu	Thr	Asp	Pro	Glu	Met	3189		

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Ala Ala Val Ile	20	Leu Lys Ala Leu	25	Glu Ala Pro Leu	30	Asp Gly Asn	3237	
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Asn Lys Met Gly	50	Tyr Phe Val Thr	55	Pro Arg Trp Lys	60	Arg Leu Thr Glu		
tat gaa gcc ctg	65	acc gtt tat gcg	70	ccc cag ccc aac	75	gcc gac tgg atc gcc	3333	
Tyr Glu Ala Leu	80	Thr Val Tyr Ala	85	Gln Pro Asn Ala	90	Asp Trp Ile Ala		
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Gly Gly Leu Asp	110	Trp Gly Asp Trp	115	Thr Gln Lys Phe	120	His Gly Gly Arg		
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Pro Ser Trp Gly	140	Asn Glu Thr Thr	145	Glu Leu Arg Thr	150	Val Asp Trp Phe		
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Lys His Arg Asp	170	Pro Leu Arg Arg	175	Trp His Ala Pro	180	Tyr Val Lys Asp		
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Lys Ala Glu Trp	200	Arg Tyr Thr Asp	205	Arg Phe Leu Gln	210	Gly Tyr Ser		
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Ala Asp Gly Gln	230	Ile Arg Ala Met	235	Pro Thr Trp Arg	240	Asp Glu Phe		
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Val Ser Leu Ala	320	Phe Trp Gly Phe	325	Asp Lys Ile Asp	330	Ile Ala Gln Met		
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Ile Gln Leu Glu	350	Arg Gly Phe Leu	355	Ala Lys Ile Val	360	Pro Gly Phe Asp		
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Glu Ser Thr Ala	380	Val Pro Lys Ala	385	Glu Trp Thr Asn	390	Gly Glu Val Tyr		
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Trp Asn Glu Ser	440	Ala Phe Ser Val	445	His Ala Val Tyr	450	Asp Ala Leu Phe		
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Gly Gln Phe Val	470	Arg Arg Glu Phe	475	Gln Arg Leu Ala	480	Pro Arg Phe		
ggc gac aat ctg	485	acc cca ttc ttc	490	atc aac cag gcc	495	cag aca tac ttc	4005	
Gly Asp Asn Leu	500	Thr Pro Phe Phe	505	Ile Asn Gln Ala	510	Gln Thr Tyr Phe		
cag atc gcc aag	515	cag ggc gta cag	520	gat ctg tat tac	525	aac tgt ctg ggt	4053	
Gln Ile Ala Lys	530	Gln Gly Val Gln	535	Asp Leu Tyr Tyr	540	Asn Cys Leu Gly		

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Asp	Asp	Pro	Glu	Phe	Ser	Asp	Tyr	Asn	Arg	Thr	Val	Met	Arg	Asn	Trp	
305					310				315						320	
acc	ggc	aag	tgg	ctg	gag	ccc	acg	atc	gcc	gct	ctg	cgc	gac	ttc	atg	4149
Thr	Gly	Lys	Trp	Leu	Glu	Pro	Thr	Ile	Ala	Ala	Leu	Arg	Asp	Phe	Met	
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Gly	Leu	Phe	Ala	Lys	Leu	Pro	Ala	Gly	Thr	Thr	Asp	Lys	Glu	Glu	Ile	
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acc	gcg	tcc	ctg	tac	cgg	gtg	gtc	gac	gac	tgg	atc	gag	gac	tac	gcc	4245
Thr	Ala	Ser	Leu	Tyr	Arg	Val	Val	Asp	Asp	Trp	Ile	Glu	Asp	Tyr	Ala	
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Ser	Ala	Ile	Asp	Phe	Lys	Ala	Asp	Arg	Asp	Gln	Ile	Val	Lys	Ala	Val	
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Leu	Ala	Gly	Leu	Lys				Met	Ser	Val	Asn	Ser	Asn			
385								1				5				
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Gln	Phe	Phe	Ala	Asp	Glu	Asn	Gln	Val	Val	His	Glu	Ser	Asp	Thr	Val	
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Lys	Leu	Glu	Asp	Tyr	His	Ala			Met	Ala	Lys	Leu	Gly			
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Ile	His	Ser	Asn	Asp	Thr	Arg	Asp	Ala	Trp	Val	Asn	Lys	Ile	Ala	Gln	
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ctc	aac	acc	ctg	gaa	aaa	gcg	gcc	gag	atg	ctg	aag	cag	ttc	cgg	atg	4874
Leu	Asn	Thr	Leu	Glu	Lys	Ala	Ala	Glu	Met	Leu	Lys	Gln	Phe	Arg	Met	
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gac	cac	acc	acg	ccg	ttc	cgc	aac	agc	tac	gaa	ctg	gac	aac	gac	tac	4922
Asp	His	Thr	Thr	Pro	Phe	Arg	Asn	Ser	Tyr	Glu	Leu	Asp	Asn	Asp	Tyr	
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ctc	tgg	atc	gag	gcc	aag	ctc	gaa	gag	aag	gtc	gcc	gtc	ctc	aag	gca	4970

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Leu	Trp	Ile	Glu	Ala	Lys	Leu	Glu	Glu	Lys	Val	Ala	Val	Leu	Lys	Ala		
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70					75					80					85		
gat	gcc	aag	tcc	gtt	ctg	gac	ggc	acc	gtc	gcg	aag	atg	aac	gcg	gcc	5066	
Asp	Ala	Lys	Ser	Val	Leu	Asp	Gly	Thr	Val	Ala	Lys	Met	Asn	Ala	Ala		
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Lys	Asp	Lys	Trp	Glu	Ala	Glu	Lys	Ile	His	Ile	Gly	Phe	Arg	Gln	Ala		
			105					110					115				
tac	aag	ccg	ccg	atc	atg	ccg	gtg	aac	tat	ttc	ctg	gac	ggc	gag	cgt	5162	
Tyr	Lys	Pro	Pro	Ile	Met	Pro	Val	Asn	Tyr	Phe	Leu	Asp	Gly	Glu	Arg		
			120				125					130					
cag	ttg	ggg	acc	cgg	ctg	atg	gaa	ctg	cgc	aac	ctc	aac	tac	tac	gac	5210	
Gln	Leu	Gly	Thr	Arg	Leu	Met	Glu	Leu	Arg	Asn	Leu	Asn	Tyr	Tyr	Asp		
	135					140					145						
acg	ccg	ctg	gaa	gaa	ctg	cgc	aaa	cag	cgc	ggt	gtg	cgg	gtg	gtg	cat	5258	
Thr	Pro	Leu	Glu	Glu	Leu	Arg	Lys	Gln	Arg	Gly	Val	Arg	Val	Val	His		
150					155					160					165		
ctg	cag	tcg	ccg	cac	tga	agggaggaag	tctcgcctg	gacgcgacgg								5306	
Leu	Gln	Ser	Pro	His													
				170													
catcgcctgtg	aagtcagg	ggcagg	gatg	ccgttc	ccgg	caggct	ggcccc	ggaat	5366								
ctctgg	tttt	cagggg	cg	gccgg	ttcc	ac	ggctcccc	ctccat	cttt	cgtaagg	aaa	5426					
tcacc	atg	gtc	gaa	tcg	gca	ttt	cag	cca	ttt	tcg	ggc	gac	gca	gac	gaa	5476	
	Met	Val	Glu	Ser	Ala	Phe	Gln	Pro	Phe	Ser	Gly	Asp	Ala	Asp	Glu		
	1				5				10					15			
tgg	ttc	gag	gaa	cca	cgg	ccc	cag	gcc	ggt	ttc	ttc	cct	tcc	gcg	gac	5524	
Trp	Phe	Glu	Glu	Pro	Arg	Pro	Gln	Ala	Gly	Phe	Phe	Pro	Ser	Ala	Asp		
				20					25					30			
tgg	cat	ctg	ctc	aaa	cgg	gac	gag	acc	tac	gca	gcc	tat	gcc	aag	gat	5572	
Trp	His	Leu	Leu	Lys	Arg	Asp	Glu	Thr	Tyr	Ala	Ala	Tyr	Ala	Lys	Asp		
			35					40					45				
ctc	gat	ttc	atg	tgg	cgg	tgg	gtc	atc	gtc	cg	gaa	gaa	agg	atc	gtc	5620	
Leu	Asp	Phe	Met	Trp	Arg	Trp	Val	Ile	Val	Arg	Glu	Glu	Arg	Ile	Val		
			50				55					60					
cag	gag	ggt	tgc	tcg	atc	agc	ctg	gag	tcg	tcg	atc	cg	gcc	gtg	acg	5668	
Gln	Glu	Gly	Cys	Ser	Ile	Ser	Leu	Glu	Ser	Ser	Ile	Arg	Ala	Val	Thr		
	65					70					75						
cac	gta	ctg	aat	tat	ttt	ggt	atg	acc	gaa	caa	cg	gcc	ccg	gca	gag	5716	
His	Val	Leu	Asn	Tyr	Phe	Gly	Met	Thr	Glu	Gln	Arg	Ala	Pro	Ala	Glu		
	80				85				90					95			
gac	cgg	acc	ggc	gga	gtt	caa	cat	tga	acagg	taagt	tt	atg	cag	cga	gtt	5767	
Asp	Arg	Thr	Gly	Gly	Val	Gln	His					Met	Gln	Arg	Val		
				100								1					
cac	act	atc	acg	gcg	gtg	acg	gag	gat	ggc	gaa	tcg	ctc	cg	ttc	gaa	5815	
His	Thr	Ile	Thr	Ala	Val	Thr	Glu	Asp	Gly	Glu	Ser	Leu	Arg	Phe	Glu		
	5				10				15					20			
tgc	cgt	tcg	gac	gag	gac	gtc	atc	acc	gcc	gca	ctg	cg	cag	aac	atc	5863	
Cys	Arg	Ser	Asp	Glu	Asp	Val	Ile	Thr	Ala	Ala	Leu	Arg	Gln	Asn	Ile		
				25					30					35			
ttt	ctg	atg	tcg	tcc	tgc	cgg	gag	ggc	ggc	tgt	gcg	acc	tgc	aag	gcc	5911	
Phe	Leu	Met	Ser	Ser	Cys	Arg	Glu	Gly	Gly	Cys	Ala	Thr	Cys	Lys	Ala		
			40					45					50				

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ttg	tgc	agc	gaa	ggg	gac	tac	gac	ctc	aag	ggc	tgc	agc	gtt	cag	gcg	5959
Leu	Cys	Ser	Glu	Gly	Asp	Tyr	Asp	Leu	Lys	Gly	Cys	Ser	Val	Gln	Ala	
		55					60					65				
ctg	ccg	ccg	gaa	gag	gag	gag	gaa	ggg	ttg	gtg	ttg	ttg	tgc	cgg	acc	6007
Leu	Pro	Pro	Glu	Glu	Glu	Glu	Glu	Gly	Leu	Val	Leu	Leu	Cys	Arg	Thr	
	70					75					80					
tac	ccg	aag	acc	gac	ctg	gaa	atc	gaa	ctg	ccc	tat	acc	cat	tgc	cgc	6055
Tyr	Pro	Lys	Thr	Asp	Leu	Glu	Ile	Glu	Leu	Pro	Tyr	Thr	His	Cys	Arg	
85					90					95					100	
atc	agt	ttt	ggt	gag	gtc	ggc	agt	ttc	gag	gcg	gag	gtc	gtc	ggc	ctc	6103
Ile	Ser	Phe	Gly	Glu	Val	Gly	Ser	Phe	Glu	Ala	Glu	Val	Val	Gly	Leu	
			105						110					115		
aac	tgg	gtt	tcg	agc	aac	acc	gtc	cag	ttt	ctt	ttg	cag	aag	cgg	ccc	6151
Asn	Trp	Val	Ser	Ser	Asn	Thr	Val	Gln	Phe	Leu	Leu	Gln	Lys	Arg	Pro	
			120					125					130			
gac	gag	tgc	ggc	aac	cgt	ggc	gtg	aaa	ttc	gaa	ccc	ggt	cag	ttc	atg	6199
Asp	Glu	Cys	Gly	Asn	Arg	Gly	Val	Lys	Phe	Glu	Pro	Gly	Gln	Phe	Met	
		135				140						145				
gac	ctg	acc	atc	ccc	ggc	acc	gat	gtc	tcc	cgc	tcc	tac	tcg	ccg	gcg	6247
Asp	Leu	Thr	Ile	Pro	Gly	Thr	Asp	Val	Ser	Arg	Ser	Tyr	Ser	Pro	Ala	
	150				155						160					
aac	ctt	cct	aat	ccc	gaa	ggc	cgc	ctg	gag	ttc	ctg	atc	cgc	gtg	tta	6295
Asn	Leu	Pro	Asn	Pro	Glu	Gly	Arg	Leu	Glu	Phe	Leu	Ile	Arg	Val	Leu	
165					170					175					180	
ccg	gag	gga	cgg	ttt	tcg	gac	tac	ctg	cgc	aat	gac	gcg	cgt	gtc	gga	6343
Pro	Glu	Gly	Arg	Phe	Ser	Asp	Tyr	Leu	Arg	Asn	Asp	Ala	Arg	Val	Gly	
			185						190					195		
cag	gtc	ctc	tcg	gtc	aaa	ggg	cca	ctg	ggc	gtg	ttc	ggt	ctc	aag	gag	6391
Gln	Val	Leu	Ser	Val	Lys	Gly	Pro	Leu	Gly	Val	Phe	Gly	Leu	Lys	Glu	
			200					205					210			
cgg	ggc	atg	gcg	ccg	cgc	tat	ttc	gtg	gcc	ggc	ggc	acc	ggg	ttg	gcg	6439
Arg	Gly	Met	Ala	Pro	Arg	Tyr	Phe	Val	Ala	Gly	Gly	Thr	Gly	Leu	Ala	
		215					220					225				
ccg	gtg	gtc	tcg	atg	gtg	cgg	cag	atg	cag	gag	tgg	acc	gcg	ccg	aac	6487
Pro	Val	Val	Ser	Met	Val	Arg	Gln	Met	Gln	Glu	Trp	Thr	Ala	Pro	Asn	
	230				235						240					
gag	acc	cgc	atc	tat	ttc	ggt	gtg	aac	acc	gag	ccg	gaa	ttg	ttc	tac	6535
Glu	Thr	Arg	Ile	Tyr	Phe	Gly	Val	Asn	Thr	Glu	Pro	Glu	Leu	Phe	Tyr	
245					250					255					260	
atc	gac	gag	ctc	aaa	tcc	ctg	gaa	cga	tcg	atg	cgc	aat	ctc	acc	gtg	6583
Ile	Asp	Glu	Leu	Lys	Ser	Leu	Glu	Arg	Ser	Met	Arg	Asn	Leu	Thr	Val	
			265						270					275		
aag	gcc	tgt	gtc	tgg	cac	ccg	agc	ggg	gac	tgg	gaa	ggc	gag	cag	ggc	6631
Lys	Ala	Cys	Val	Trp	His	Pro	Ser	Gly	Asp	Trp	Glu	Gly	Glu	Gln	Gly	
			280					285					290			
tcg	ccc	atc	gat	gcg	ttg	cgg	gaa	gac	ctg	gag	tcc	tcc	gac	gcc	aac	6679
Ser	Pro	Ile	Asp	Ala	Leu	Arg	Glu	Asp	Leu	Glu	Ser	Ser	Asp	Ala	Asn	
		295					300					305				
ccg	gac	att	tat	ttg	tgc	ggt	ccg	ccg	ggc	atg	atc	gat	gcc	gcc	tgc	6727
Pro	Asp	Ile	Tyr	Leu	Cys	Gly	Pro	Pro	Gly	Met	Ile	Asp	Ala	Ala	Cys	
	310					315					320					
gag	ctg	gta	cgc	agc	cgc	ggt	atc	ccc	ggc	gaa	cag	gtc	ttc	ttc	gaa	6775
Glu	Leu	Val	Arg	Ser	Arg	Gly	Ile	Pro	Gly	Glu	Gln	Val	Phe	Phe	Glu	
325					330					335					340	
aaa	ttc	ctg	ccg	tcc	ggg	gcg	gcc	tga	acc	ggg	gaag	tacc	gtg	acc		6822



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Lys Phe Leu Pro Ser Gly Ala Ala  
345

accgagcagt	tcccgcccca	attcctgcgt	gaaatgatcg	agcagctgga	cgccagcatc	6882
caggagctcg	cacgcaagga	aaagggactt	gcggcatccc	tgggcacggg	ccgggtcgcc	6942
gagctcaagg	aatactggga	ccacgttctc	actcccagag	aggaatggga	gctcaagcga	7002
ccatggactt	ccgcgaccgg	gaactggtgt	ggatctggtc	ccgtctcagg	cgggcccga	7062
cctcccgcg	caatgccggg	gaggcctata	tcgccagctg	tcgccggcg	cgcgaaaaa	7122
cgaacaatcc	tgaaacggag	tcgacgggta	tcgttgggaa	aaaggttatc	tgtcgcccta	7182
ttttgt						7188